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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/516,627	11/07/2005	Dirk Marsitzky	13077*114 (LeA 35,985)	6971
23416 7590 05/26/2010 CONNOLLY BOVE LODGE & HUTZ, LLP P O BOX 2207 WILMINGTON, DE 19899				
EXAMINER				
YAMNITZKY, MARIE ROSE				
ART UNIT		PAPER NUMBER		
1786				
MAIL DATE		DELIVERY MODE		
05/26/2010		PAPER		

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

### Office Action Summary

**Application No.**

10/516,627

**Applicant(s)**

MARSITZKY ET AL.

**Examiner**

Marie R. Yamnitzky

**Art Unit**

1786

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 05 February 2010.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 30-53 is/are pending in the application.
- 4a) Of the above claim(s) 38, 47, 48, 52 and 53 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 30-37, 39-46 and 49-51 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB06)  
Paper No(s)/Mail Date 05 Feb 2010.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_.
- 5) ☐ ~~Notes of Informal Patent Application~~
- 6) ☐ Other: \_\_\_\_\_.

1. This Office action is in response to applicant's amendment filed February 05, 2010, which cancels claims 1-29 and adds claims 30-53.

Claims 30-53 are pending.

2. The references listed in the Information Disclosure Statement filed February 05, 2010 have been considered by the examiner and are made of record.

3. All claim rejections and objections as set forth in the Office action mailed August 05, 2009 are rendered moot by claim cancellation.

Applicant's arguments filed February 05, 2010 have been taken into consideration when making the rejections set forth in this action.

4. The claims remain subject to restriction and election of species requirements based on lack of unity under PCT rules.

Applicant has not indicated which of new claims 30-53 read on the previously elected invention and species.

Applicant previously elected Group I, drawn to a polymer that is conjugated and contains at least one covalently bonded metal complex, and an electroluminescent arrangement containing such a polymer. New claims 30-46 and 49-51 read on Group I.

With respect to the election of species requirement, applicant previously elected a polymer having a structure of general formula C wherein Ar<sup>1</sup> is a 9,9'-dialkylfluorenyl residue

and M is iridium (III), but there was some confusion as to the election with respect to the variables  $L^1$  and  $L^2$ . In the reply filed on April 16, 2009, applicant stated "L is a 4-fluorenyl-2-pyridine as exemplified in Example 8 on page 57", but the ligands in the Example 8 polymer which correspond to  $L^1$  and  $L^2$  of formula C are not 4-fluorenyl-2-pyridine. Based on telephone conversations with Eamonn Morrison on July 23, 2009, the elected species was/is a polymer of formula C in which  $L^1$  and  $L^2$  are 4-fluorophenyl-2-pyridine ligands. Thus, the elected species is a polymer similar to Example 8, but having a different  $L^1$  ligand than in Example 8. Applicant identified claims 1-23, 27 and 28 as reading on the elected species, and the examiner included claims 1-23, 27 and 28 in the previous action as reading on the elected species, but some of those claims did not meet  $L^1 = 4\text{-fluorophenyl-2-pyridine}$ . Claims 1-23, 27 and 28 did encompass the Example 8 polymer.

For purposes of continued examination, the examiner treats the claims based on an election of either of the following two species:

(A) a polymer of formula C wherein  $Ar^1$  is a 9,9'-dialkylfluorenyl residue, M is iridium (III), and each of  $L^1$  and  $L^2$  are 4-fluorophenyl-2-pyridine ligands; and

(B) a polymer of formula C wherein  $Ar^1$  is a 9,9'-dialkylfluorenyl residue, M is iridium (III), and  $L^1$  and  $L^2$  are the ligands corresponding to  $L^1$  and  $L^2$  in Example 8.

Claims 30-32, 34 and 35, with claims 49-51 dependent directly or indirectly from claim 30 or 31, read on (A). Claims 30-37, 41 and 42, with claims 39, 40 and 43-46 dependent directly or indirectly from claim 37, and claims 49-51 dependent directly or indirectly from claim 30, 31, 33 or 37, read on (B).

5. Claims 47, 48, 52 and 53 are withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to a nonelected invention, there being no allowable generic or linking claim. Applicant timely traversed the restriction (election) requirement between Groups I-IV in the reply filed on April 16, 2009. Claims 47 and 48 correspond to Group II, and claims 52 and 53 correspond to Group III.

6. Claim 38 is withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected species, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on April 16, 2009 (**without** traverse on the basis that applicant did not distinctly and specifically point out the supposed errors in the election of species requirement).

7. Claims 49-51 are objected to under 37 CFR 1.75(c) as being in improper form because a multiple dependent claim should refer to other claims in the alternative only. See MPEP § 608.01(n). Claims 49 and 50, with claim 51 dependent from claim 50, refer to the polymer "according to claim 30, 31 or 33 or the...polymer according to claim 37 or 38, or combinations thereof". The recitation of "or combinations thereof" provides for combinations of polymers from different claims. For purposes of this Office action, the examiner has treated these claims as if ", or combinations thereof" has been deleted from the last line of claims 49 and 50.

8. Claims 37, 39-46 and 49-51 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for a luminescent polymer comprising a conjugated main chain and at least one covalently bonded metal complex wherein the luminescent polymer has a structure of general formula (Ia) and (Ib), does not reasonably provide enablement for the full scope of such polymers as further defined by the requirement that the luminescence be a combination of fluorescence of the conjugated main chain and phosphorescence of the at least one covalently bonded metal complex as recited in claim 37 (with claims 39-46 and 49-51 dependent directly or indirectly therefrom) or as further defined by the emission characteristics recited in claims 39 and 40. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the invention commensurate in scope with these claims.

It is not clear from the specification whether all luminescent polymers having a structure of general formula (Ia) or (Ib) as defined in independent claim 37 and/or as further defined in dependent claims 41-46 inherently provide luminescence which is a combination of fluorescence and phosphorescence as required by the language of claim 37. Insufficient guidance is provided in the specification to enable one of ordinary skill in the art at the time of the invention to make and use the full scope of polymers within the scope of claim 37 and dependents wherein the polymers are required to provide a combination of fluorescence and phosphorescence.

Further, based on the data in the specification, not all luminescent polymers having a structure of general formula (Ia) or (Ib) as defined in claim 37 have the emission characteristics recited in claims 39 and 40. The specification provides only three specific examples of polymers

having the emission characteristics recited in claims 39 and 40, each of which is a polymer of formula (Ia-1) wherein  $Ar^1$  is a unit of formula (II-d) wherein R is n-octyl, and  $L^2$  is a ligand of formula (Iva-1) wherein each R is hydrogen, or the R at the 4-position on the phenyl ring is fluorine and the each other R is hydrogen. The polymers having the emission characteristics recited in claims 39 and 40 are defined much more broadly with respect to formula (Ia) and (Ib) in claim 37.

9. Claims 30-36 and 49-51 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 49-51 are included in this rejection as dependent directly or indirectly from any of claims 30, 31 or 33.

The scope of  $Ar^1$  and  $Ar^2$  for the polymers having a structure of general formulae C or D per claims 30-32 and per claims 34 and 35 is not clear because of inconsistencies between the definitions for these variables as set forth in independent claims 30 and 34 versus as set forth in dependent claims 31, 32 and 35. Claims 30 and 34 define these variables as representing a certain set of aryl units and/or heteroaryl units. Claims 31, 32 and 35 set forth heteroaryl units that are outside the scope of heteroaryl units as defined in claims 30 and 34. For example, formula XXX of claims 31, 32 and 35 is a heteroaryl unit having four ring C atoms and 1 ring hetero (sulphur) atom whereas claims 30 and 34 recite "heteroaryl units having 5 to 9 ring C atoms and 1 to 3 ring hetero atoms from the group consisting of nitrogen, oxygen and sulphur".

Formula XXX is one of several formulae shown in claims 31, 32 and 35 that represent heteroaryl units that do not meet the “5 to 9 ring C atoms” limitation of the heteroaryl units per claims 30 and 34. Based on the definition of “R” in claims 31 and 35, claim 31 also encompasses substituted aryl and heteroaryl units outside the scope of those recited in claims 30 and 34. The “optionally C<sub>1</sub>-C<sub>30</sub>-alkyl-substituted” language of claims 30 and 34 appears to only encompass aryl and heteroaryl units that are unsubstituted or are substituted with C<sub>1</sub>-C<sub>30</sub> alkyl. Claim 32 does not define the variable “R”. For consistency with claim 30, R should be limited to hydrogen or C<sub>1</sub>-C<sub>30</sub> alkyl. Alternatively, if R may be as defined in claim 31 or as defined in claim 34, or if R may be hydrogen or any substituent given the lack of a definition in claim 32, then the two occurrences of the phrase “optionally C<sub>1</sub>-C<sub>30</sub>-alkyl-substituted” should be deleted from the definition of Ar<sup>1</sup> and Ar<sup>2</sup> in claims 30 and 34.

Claims 30 and 34 (with claims 31 and 35 dependent from 30 and 34, respectively) allow “M” to be gallium (III) but requires the claimed polymer to be a phosphorescent polymer comprising at least one covalently bonded phosphorescent metal complex. The definition of M as gallium is inconsistent with the requirement for a phosphorescent metal complex and phosphorescent polymer.

The variable “Ar” as shown in formulae XXIV and XXIX in claims 30, 32 and 34 is not defined.

The scope of polymers per claim 33 is not clear in reciting “having repeating units selected from the general formulae A and B-I-1 to B-I-5, or A and B-II-1 to B-II-4”. It is not



clear if at least one repeating unit of A must be in combination with at least one repeating unit selected from B-I-1, B-I-3, B-I-4, B-I-5, B-II-1, B-II-2, B-II-3 and B-II-4.

Likewise, the scope of polymers per claim 36 is not clear in reciting “having repeating units selected from the general formulae A and B-I-1 to B-I-6, or A and B-II-1 to B-II-4”. It is not clear if at least one repeating unit of A must be in combination with at least one repeating unit selected from B-I-1, B-I-3, B-I-4, B-I-5, B-I-6, B-II-1, B-II-2, B-II-3 and B-II-4.

Formulae B-II-1 and B-II-4 in claims 33 and 36 are the same.

The variable “Ar<sup>3</sup>” in formula B-I-5 in claims 33 and 36 is not defined.

Formula B-II-2 in claims 33 and 36 provides a repeating unit in which the metal complex is a gallium complex, but claims 33 and 36 are limited to a phosphorescent polymer comprising at least one phosphorescent metal complex. It is not clear how the gallium complex unit of formula B-II-2 can provide a phosphorescent polymer. It is not clear if the B-II-2 structure must be used in combination with one of the B structures comprising Ir or Pt.

In claim 33, the spacing of the lines with respect to the formulae for Ar<sup>1</sup>, Ar<sup>2</sup> and L is confusing (bottom half of page 10 of the amendment filed February 05, 2010). The claim needs to be rewritten so that it is clear which formulae define which variable.

10. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

11. Claims 33, 36 and 49-51 are rejected under 35 U.S.C. 102(e) as being anticipated by Ikehira et al. (US 2002/0193532 A1).

See the entire patent application publication. Ikehira et al. describe polymers that are conjugated, neutral and contain at least one covalently bonded metal complex that shows light emission from a triplet excited state (i.e. is a phosphorescent metal complex).

The polymers of Ikehira's Examples 3-5 are polymers comprising a repeating unit of general formula A per present independent claims 33 and 36, and a covalently bonded phosphorescent metal complex. Given the open language of the present claims and the lack of clarity with respect to the scope of polymers encompassed by the present claim language, the claims are interpreted as encompassing polymers such as the polymers of Ikehira's Examples 3-5. The prior art polymers have repeating units of present general formula A (and therefore having repeating units selected from general formulae A and B-I-1 to B-II-4), and the additional repeating units in these prior art polymers are not excluded by the present claim language.

Ikehira's polymer LED of Example 6, which utilizes Ikehira's polymer of Example 3, meets the limitations of present claims 49-51.

12. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

13. Claims 33, 36 and 49-51 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ikehira et al. (US 2002/0193532 A1) as applied to claims 33, 36 and 49-51 above, and for the further reasons set forth below.

Presuming for the sake of argument that the language of present claims 33 and 36 with respect to units selected from general formulae A and B-I-1 to B-I-5 (B-I-1 to B-I-6 in the case of claim 36), or A and B-II-1 to B-II-4, means that the polymer must comprise at least one repeating unit of general formula A and must comprise at least one repeating unit selected from the group consisting the specified B-I-# and B-II-# formulae, then the polymers of Ikehira's Examples 3-5 do not meet the limitations of claims 33-36, and Ikehira's polymer LED of Example 6 does not meet the limitations of claims 49-51. The polymers of Ikehira's Examples 3-5 do not have a repeating unit selected from the group consisting of the specified B-I-# and B-II-# formulae. However, polymers comprising a repeating unit selected from the group consisting of the specified B-I-# and B-II-# formulae, as well as a repeating unit of formula A, are suggested by Ikehira et al. and would have been *prima facie* obvious to one of ordinary skill in the art at the time of the invention given Ikehira's disclosure.

The polymers of Ikehira's Examples 3-5 comprise a metal complex of Ir(III) that is chelated to three phenylpyridine ligands as in the first formula in paragraph [0017] on page 2 of the Ikehira reference. Based on Ikehira's teachings, metal complexes of Ir(III) chelated to three

thienylpyridine ligands as encompassed by the repeating unit of present formula B-I-3, or three benzothienylpyridine ligands as encompassed by the repeating unit of present formula B-I-4, may be used in place of a metal complex of Ir(III) chelated to three phenylpyridine ligands. See the first and third formula in the first column on page 3. It would have been *prima facie* obvious one of ordinary skill in the art at the time of the invention to make other polymers within the scope of Ikehira's disclosure and use them to make polymer LEDs as taught. One of ordinary skill in the art at the time of the invention would have reasonably expected that polymers similar to those of Ikehira's Examples 3-5, but incorporating other metal complexes that are explicitly disclosed as alternatives to the complex of the first formula in paragraph [0017], would emit light from a triplet excited state and could be used to make a polymer LED as taught.

14. Miscellaneous:

In the penultimate line of claim 32, "and" should be changed to --or-- because "M" cannot represent all three metals in a single embodiment.

15. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after

the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

16. Any inquiry concerning this communication should be directed to Marie R. Yamnitzky at telephone number (571) 272-1531. The examiner works a flexible schedule but can generally be reached at this number from 7:00 a.m. to 3:30 p.m. Monday and Wednesday-Friday.

The current fax number for all official faxes is (571) 273-8300. (Unofficial faxes to be sent directly to examiner Yamnitzky can be sent to (571) 273-1531.)

/Marie R. Yamnitzky/  
Primary Examiner, Art Unit 1786

MRY  
May 24, 2010